

Atlantic Flyway Breeding Waterfowl Plot Survey, 2019

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Introduction and Methods

The Atlantic Flyway Northeast Plot survey was considered operational in 1993 and was initiated in an effort to collect information about locally breeding waterfowl. The intent was to collect data that would provide the basis for setting waterfowl hunting regulations in the Atlantic Flyway. Currently this effort involves 11 states from Virginia to New Hampshire in which cooperators survey randomly selected 1-km² plots (Figure 1). These data are then sent to the Atlantic Flyway office in the USFWS's Division of Migratory Bird Management for analysis. This analysis produces both population and breeding pairs estimates for selected species that are surveyed.

The purpose of this report is not to provide detail about the evolution of the survey. Rather this report presents the results from the current year and compares them with the previous year and the long-term average. For a more in-depth understanding of the Atlantic Flyway breeding waterfowl plot survey (including rationale/justification, design, and implementation) please see Heusmann and Sauer (1997; 2000).

Results

Spring 2019 weather allowed for normal timing for observations of pairs and lone males. Across the survey area March and April were unusually wet with precipitation on 25 of 30 days in April in some areas. Rainfall totals were higher than normal in most areas. Throughout spring in northern areas warm and sunny days quickly changed back to rain and cold, with snow during the early portions of the survey. Northern portions of the survey area had cooler than normal temperatures, while southern areas were near normal or had above average temperatures during the survey. Generally habitat conditions were good with melting snow and early spring rains recharging many water bodies. The duck and Canada goose nesting effort appeared average to good.

As in years past stratum-within-state-, state-, stratum-, and survey-area-specific estimates will be distributed in an Excel file (Appendix A). This will make these estimates more accessible to cooperators. In 2019 we only present a single population estimate for Canada geese. This method is more comparable with that used for duck species than the calculation used up to 2002, and calculates TIB as $2 \times (\text{pairs} + \text{singles}) + \text{grouped birds}$. Breeding population and breeding pair estimates for this year are compared with estimates from 2018 (US Fish and Wildlife Service 2018) and long-term (1993-2018) averages for ten species: mallards, American black ducks, wood ducks, Canada geese, gadwall, American green-winged teal, blue-winged teal, common mergansers, hooded mergansers, and mute swans.

Caution should be used in interpreting results for gadwall, American green-winged and blue-winged teal, common and hooded mergansers, and mute swans as these estimates have large confidence intervals and estimates tend to fluctuate greatly from year to year. Changes in population or breeding pair estimates from the previous year may be seen in the data, but they are most often insignificant. Differences from the LTA may show a significant trend, but the estimates still have large confidence intervals.

References

- Heusmann, H. W. and J. R. Sauer. 1997. A survey for mallard pairs in the Atlantic Flyway. *Journal of Wildlife Management* 61:1191-1198.
- Heusmann, H. W. and J. R. Sauer. 2000. The northeastern states' waterfowl breeding population survey. *Wildlife Society Bulletin* 28:355-364.
- U.S. Fish and Wildlife Service. 2018. Atlantic Flyway Breeding Waterfowl Plot Survey report 2018. U.S. Department of the Interior, Washington D.C. USA.

Table 1: Population estimates and standard errors for mallards, black ducks, wood ducks, and Canada geese from the Atlantic Flyway Breeding Plot Survey, 1993-2019. The number of plots surveyed each year is also noted (N).

Year	N	Mallards		Black ducks		Wood ducks		Canada geese	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
1993	1,475	686,562	49,870	80,158	11,033	311,924	32,660	647,509	111,770
1994	1,468	856,313	62,774	60,930	8,667	323,285	34,730	648,684	72,971
1995	1,465	864,120	70,395	72,507	13,169	367,019	35,473	780,027	98,816
1996	1,469	848,645	61,074	77,316	17,521	344,659	32,139	932,656	107,423
1997	1,472	795,176	49,596	65,578	9,050	385,644	33,863	1,013,324	132,539
1998	1,474	775,213	49,718	81,689	20,458	382,778	28,585	970,092	115,663
1999	1,491	879,953	60,173	82,421	14,392	402,170	34,542	999,517	120,811
2000	1,480	762,555	48,701	87,009	15,421	376,212	35,008	1,022,299	101,930
2001	1,485	809,438	51,572	69,627	11,263	388,204	37,891	1,016,629	89,337
2002	1,487	833,514	56,235	68,637	12,211	420,000	37,804	1,097,135	95,091
2003	1,495	731,907	47,025	64,898	11,357	341,945	29,497	1,126,731	94,540
2004	1,485	806,554	51,747	53,891	7,713	360,185	36,035	1,073,096	93,828
2005	1,488	753,622	53,619	49,745	8,469	413,558	38,981	1,167,075	102,279
2006	1,455	721,402	47,639	51,924	8,880	400,967	34,124	1,143,951	106,242
2007	1,485	687,578	46,724	62,355	11,608	420,574	36,086	1,127,987	94,528
2008	1,476	618,588	40,659	64,948	16,762	385,943	34,460	1,024,914	82,120
2009	1,445	639,869	43,814	38,134	6,135	359,366	33,913	1,006,133	74,823
2010	1,463	649,895	49,056	37,724	8,438	407,528	34,949	969,875	92,124
2011	1,471	585,805	41,545	38,707	6,918	382,736	32,978	1,015,076	86,473
2012	1,474	612,587	45,776	28,619	4,370	418,910	33,177	879,793	71,582
2013	1,327	604,157	42,755	49,735	8,041	361,156	28,918	951,936	79,106
2014	1,290	634,582	48,937	54,493	13,141	421,557	36,137	1,084,913	114,367
2015	1,310	540,087	45,546	42,429	14,573	406,178	37,759	963,809	81,744
2016	1,306	551,258	45,110	39,750	8,468	430,636	37,494	949,990	80,130
2017	1,329	448,467	35,020	31,176	6,837	396,376	36,122	933,321	73,979
2018	1,328	482,101	44,079	35,403	10,441	394,428	36,567	1,030,936	83,165
2019	1,307	564,579	46,314	80,503	34,812	399,101	37,218	1,039,546	91,299
Long-term average		694,242	49,462	58,159	11,857	385,298	34,708	985,813	94,396
Percent change from:									
	2018	17.11		127.39		1.18		0.84	
	Long-term	-18.68		38.42		3.58		5.45	

Table 2: Breeding pair estimates and standard errors for mallards, black ducks, wood ducks, and Canada geese from the Atlantic Flyway Breeding Plot Survey, 1993-2019. The number of plots surveyed each year is also noted (N).

Year	N	Mallards		Black ducks		Wood ducks		Canada geese	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
1993	1,475	324,020	23,075	39,464	5,485	140,506	14,229	0	0
1994	1,468	427,254	31,354	29,472	4,255	148,298	14,448	202,281	19,827
1995	1,465	404,837	30,111	32,670	5,919	172,944	16,949	245,233	23,023
1996	1,469	403,919	28,367	31,674	5,042	156,201	14,023	277,608	25,468
1997	1,472	383,296	23,653	29,792	4,079	186,127	16,610	326,982	40,080
1998	1,474	374,612	24,079	31,833	4,885	184,725	13,938	324,648	29,188
1999	1,491	421,492	28,771	38,693	6,620	195,197	16,512	379,479	38,088
2000	1,480	359,398	22,288	36,006	4,902	174,417	15,066	339,936	26,316
2001	1,485	385,824	23,400	31,942	4,544	187,322	18,336	392,055	27,777
2002	1,487	400,730	26,599	29,026	3,645	202,090	18,298	405,898	32,094
2003	1,495	347,309	22,299	28,863	4,186	167,135	14,664	389,793	28,280
2004	1,485	387,141	25,135	25,028	3,499	173,292	16,971	394,626	28,065
2005	1,488	358,214	25,213	21,471	3,127	195,916	17,690	410,544	30,402
2006	1,455	345,742	22,568	24,907	4,225	194,578	16,713	384,715	27,397
2007	1,485	332,549	22,778	24,714	4,253	196,717	15,616	390,630	27,454
2008	1,476	301,455	19,717	24,160	4,350	185,781	16,638	377,535	26,774
2009	1,445	308,685	21,328	17,234	2,903	170,049	15,644	321,478	22,102
2010	1,463	300,067	22,322	15,231	2,711	197,475	17,213	359,627	26,875
2011	1,471	277,214	18,148	18,140	3,347	184,559	15,817	363,841	25,776
2012	1,474	292,799	21,529	13,407	2,093	200,618	15,832	312,766	21,763
2013	1,327	289,552	19,233	23,426	3,832	177,710	13,958	341,100	26,154
2014	1,290	301,699	22,353	20,907	4,569	209,525	17,806	357,492	27,215
2015	1,310	258,762	21,075	20,756	7,278	194,915	16,440	357,219	28,348
2016	1,306	260,793	19,638	15,214	2,417	210,335	18,447	354,215	25,953
2017	1,329	213,962	16,487	12,465	2,730	191,550	17,289	347,325	25,018
2018	1,328	221,111	18,960	15,063	4,079	189,705	17,217	369,815	27,650
2019	1,307	267,566	20,631	25,222	5,050	191,801	17,504	363,186	26,060
Long-term average		331,482	23,004	25,066	4,223	184,425	16,291	336,668	26,413
Percent change from:									
	2018	21.01		67.44		1.1		-1.79	
	Long-term	-19.28		0.62		4		7.88	

Table 3: Population estimates and standard errors for gadwall, green-winged teal, blue-winged teal, common mergansers, hooded mergansers, and mute swans from the Atlantic Flyway Breeding Plot Survey, 2003-2019. The number of plots surveyed each year is also noted (N).

Year	N	Gadwall		Green-winged teal		Blue-winged teal		Common merganser		Hooded merganser		Mute swan	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
2003	1,495	4,466	1,747	12,622	3,510	7,445	2,891	19,561	3,432	12,783	2,555	7,184	1,499
2004	1,485	3,259	1,265	8,690	2,743	16,342	5,024	19,544	6,891	20,158	5,514	9,267	2,538
2005	1,488	1,071	897	7,389	2,106	7,251	2,110	17,369	2,961	20,051	4,130	6,031	1,508
2006	1,455	1,754	839	13,665	4,194	4,494	2,778	17,233	5,117	11,563	2,463	10,184	2,938
2007	1,485	3,115	1,160	13,155	3,851	13,444	6,211	17,620	3,119	18,673	4,069	8,023	1,649
2008	1,476	971	430	12,172	4,315	7,035	4,069	18,520	3,329	14,361	3,322	9,979	3,880
2009	1,445	3,012	1,214	16,833	4,220	11,396	4,434	16,485	3,174	10,087	2,569	8,556	2,143
2010	1,463	629	404	10,270	3,620	5,007	2,269	16,353	5,533	7,294	2,140	9,514	1,846
2011	1,471	2,880	1,320	15,207	7,153	3,637	1,509	23,169	4,062	13,323	3,024	8,524	1,752
2012	1,474	934	430	16,631	4,670	6,496	2,158	20,620	3,528	15,998	3,624	8,481	1,834
2013	1,327	3,078	1,155	15,974	4,238	10,372	4,469	22,886	3,834	18,432	3,506	9,245	4,164
2014	1,290	3,606	1,621	8,791	2,578	10,676	3,963	24,787	4,164	16,851	4,987	8,688	1,836
2015	1,310	2,717	1,100	14,529	4,163	5,911	2,022	25,589	8,056	23,237	4,100	6,564	1,513
2016	1,306	2,481	1,103	11,393	2,877	6,923	2,409	23,539	4,198	16,273	2,964	6,318	1,474
2017	1,329	3,033	1,885	12,747	4,938	5,512	3,056	26,153	4,685	14,289	2,767	7,362	2,800
2018	1,328	3,134	1,154	27,155	6,529	9,134	2,910	28,487	4,512	22,229	4,429	6,272	1,620
2019	1,307	2,305	1,125	7,294	3,001	4,048	1,413	34,078	6,287	12,652	3,090	10,277	5,110
Long-term average		2,497	1,109	13,207	4,042	7,948	3,159	21,882	4,522	15,780	3,485	8,263	2,359
Percent change from:													
	2018	-26.45		-73.14		-55.68		19.63		-43.08		63.86	
	Long-term	-7.69		-44.77		-49.07		55.74		-19.82		24.37	

Table 4: Breeding pair estimates and standard errors for gadwall, green-winged teal, blue-winged teal, common mergansers, hooded mergansers, and mute swans from the Atlantic Flyway Breeding Plot Survey, 2003-2019. The number of plots surveyed each year is also noted (N).

Year	N	Gadwall		Green-winged teal		Blue-winged teal		Common merganser		Hooded merganser		Mute swan	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
2003	1,495	8,933	3,494	60,173	13,237	33,948	11,397	45,653	8,306	28,878	5,518	0	0
2004	1,485	11,247	5,272	55,016	13,356	39,344	11,862	49,163	14,923	44,143	11,366	0	0
2005	1,488	16,062	14,012	36,321	9,097	19,066	6,467	40,420	7,027	43,035	8,921	0	0
2006	1,455	7,199	3,320	64,402	17,330	8,988	5,556	43,214	12,409	34,355	9,931	0	0
2007	1,485	6,230	2,321	55,108	11,019	42,505	19,342	49,230	9,710	43,121	9,356	0	0
2008	1,476	8,438	6,540	43,958	12,706	15,105	8,201	39,515	7,084	31,197	6,878	0	0
2009	1,445	14,341	6,139	65,816	12,510	22,937	8,872	39,980	7,553	23,585	5,388	0	0
2010	1,463	3,806	2,668	70,415	22,528	35,782	25,828	42,129	12,408	18,605	4,787	0	0
2011	1,471	6,078	2,650	61,412	20,495	8,761	3,364	52,232	9,302	28,078	6,185	0	0
2012	1,474	5,557	3,726	60,028	13,751	13,224	4,325	50,128	9,106	34,092	7,544	0	0
2013	1,327	13,746	7,923	70,486	21,009	20,744	8,938	55,550	10,064	45,344	8,651	0	0
2014	1,290	25,361	11,879	48,367	14,975	25,205	8,798	57,219	9,645	42,340	11,806	0	0
2015	1,310	8,328	3,399	67,063	25,336	11,821	4,043	59,936	16,856	51,567	8,919	0	0
2016	1,306	6,292	2,411	49,674	11,794	13,846	4,819	53,692	9,360	37,225	6,603	0	0
2017	1,329	9,832	4,604	40,262	12,511	11,024	6,112	54,496	9,631	38,284	6,918	0	0
2018	1,328	6,631	2,322	85,645	24,404	24,747	9,605	69,023	12,630	106,757	49,916	0	0
2019	1,307	28,185	17,961	47,941	25,607	8,097	2,826	94,333	25,226	27,849	6,605	20,553	10,221
Long-term average		10,957	5,920	57,770	16,569	20,891	8,844	52,701	11,249	39,909	10,311	1,209	601
Percent change from:													
	2018	325.05		-44.02		-67.28		36.67		-73.91		Inf	
	Long-term	157.23		-17.01		-61.24		79		-30.22		1600	

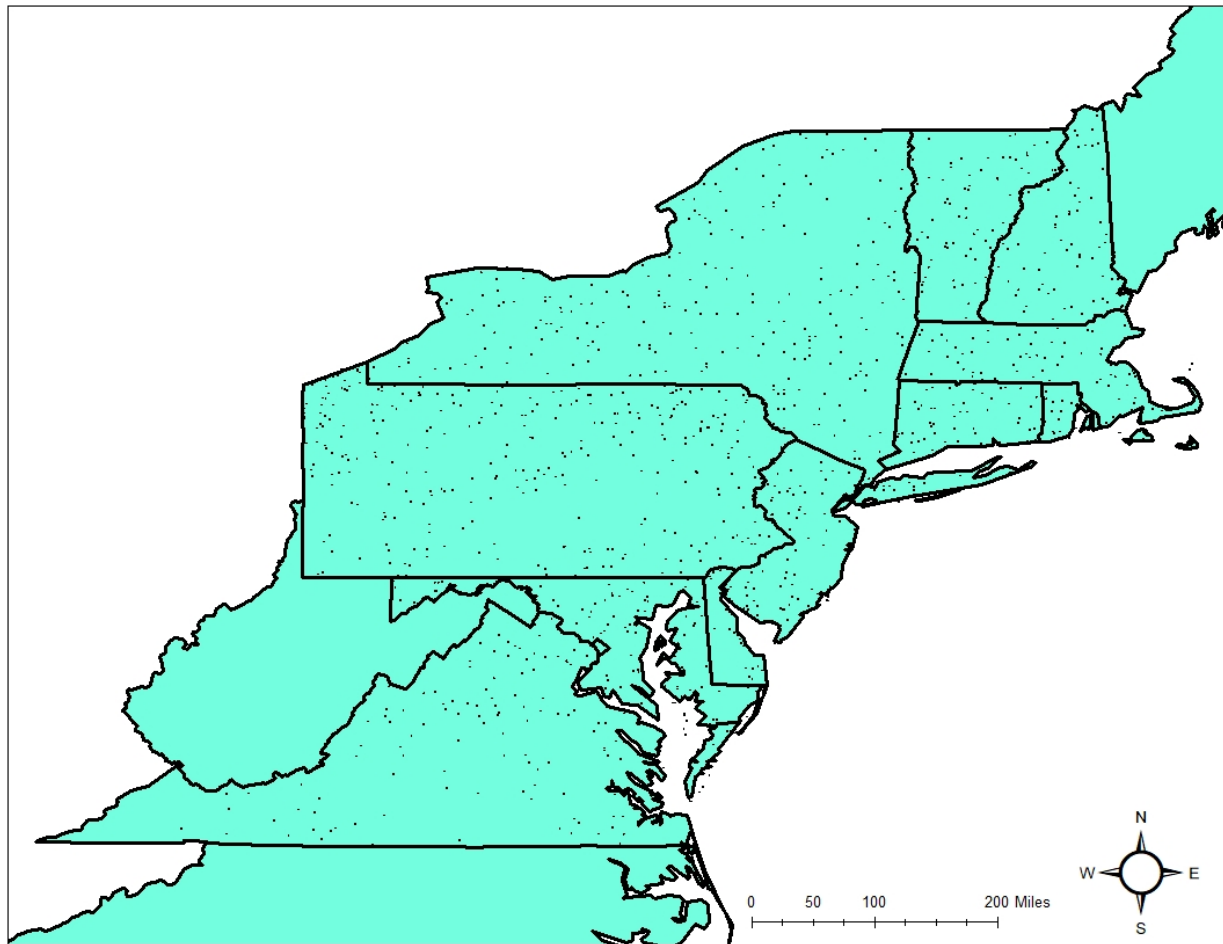


Figure 1: Map of 1-km2 plots in the Atlantic Flyway breeding plot survey, Virginia to New Hampshire.

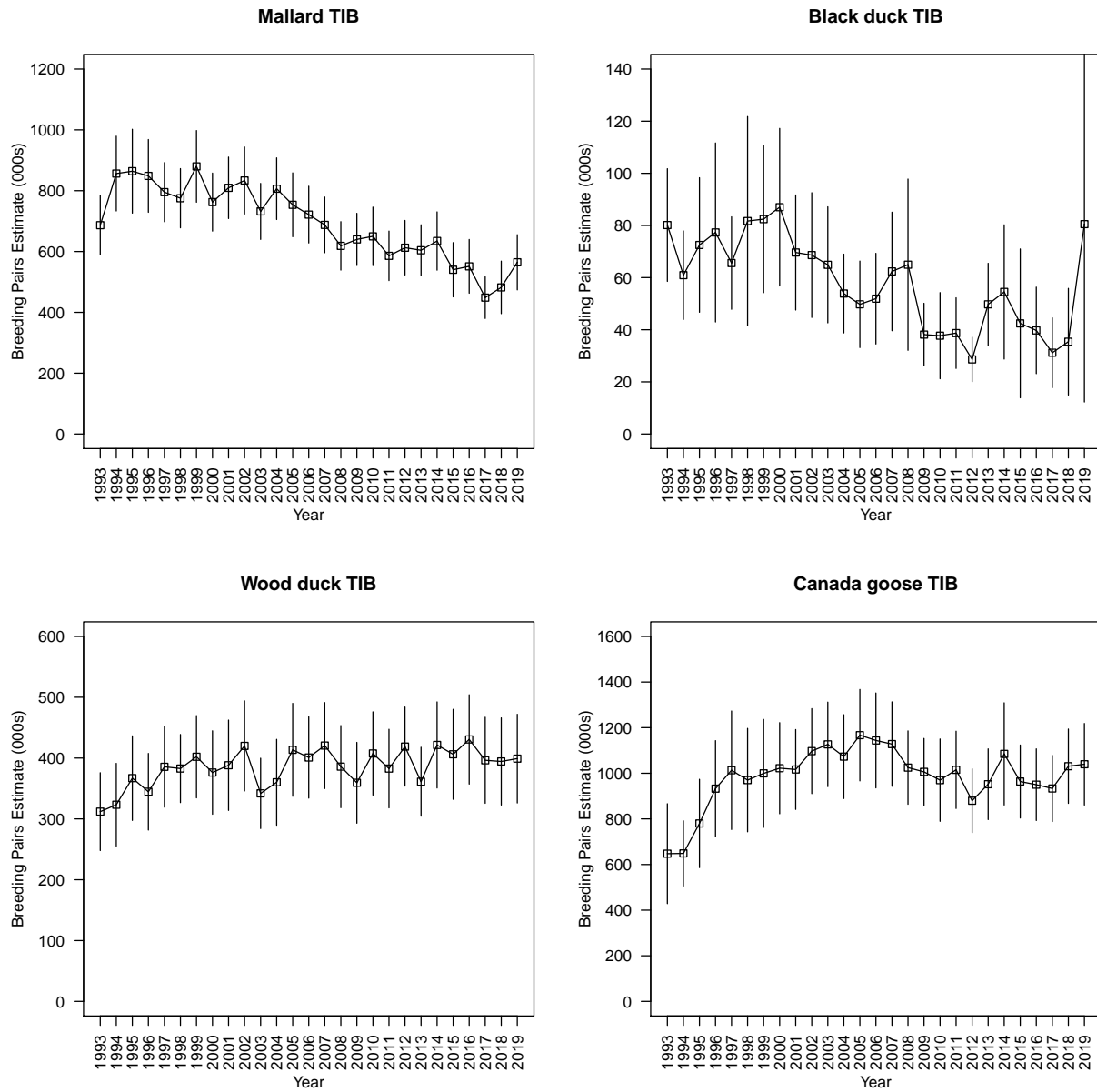


Figure 2: Population estimates (total indicated birds [TIB]) and 95% confidence intervals from the Atlantic Flyway breeding waterfowl plot survey for mallards, American black ducks, wood ducks, and Canada geese, 1993-2019.

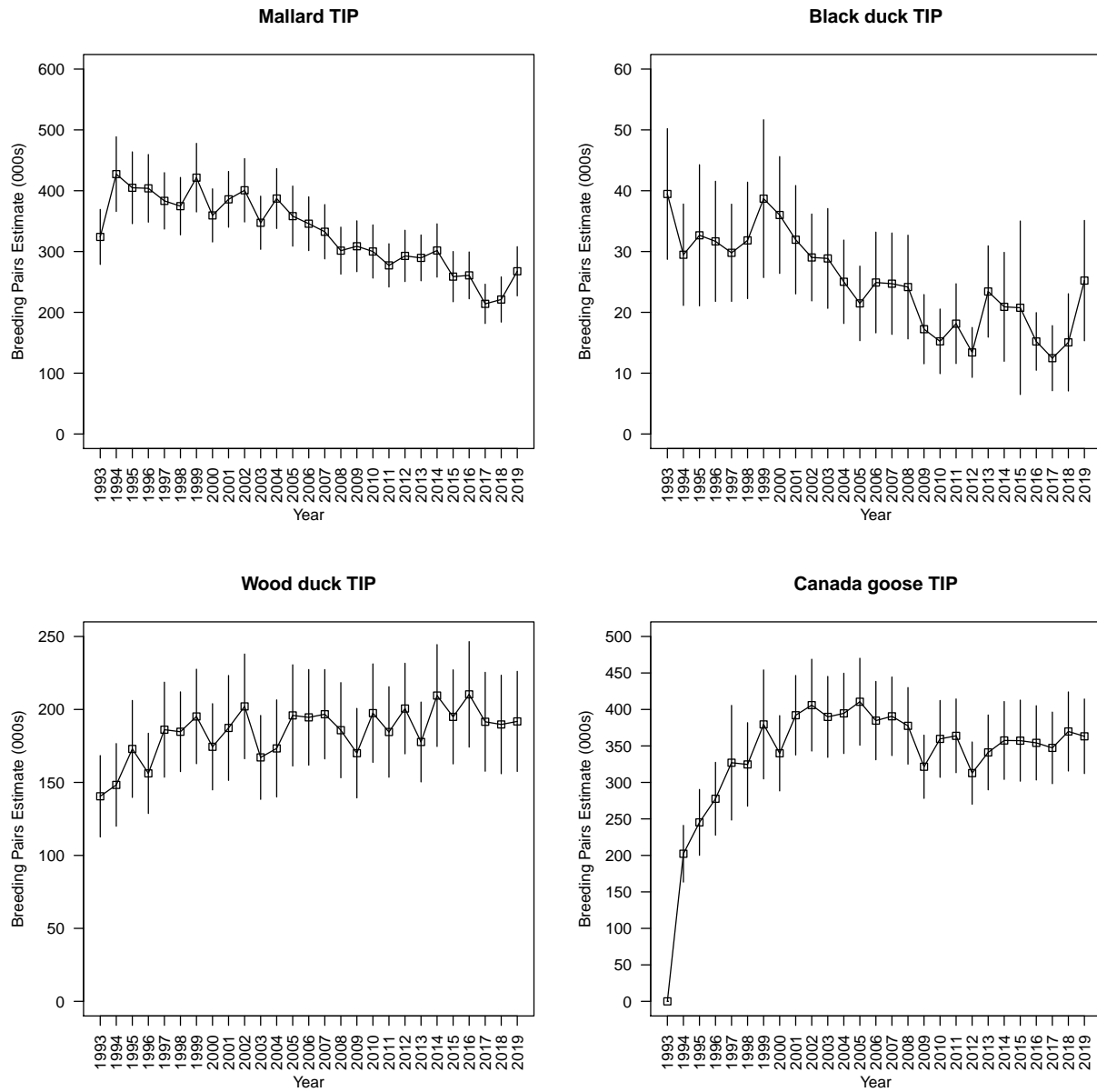


Figure 3: Breeding pair estimates (total indicated pairs [TIP]) and 95% confidence intervals from the Atlantic Flyway breeding waterfowl plot survey for mallards, American black ducks, wood ducks, and Canada geese, 1993-2019.